



Geoethics implications in volcanic hazards in Argentina: 24 years of uninterrupted ash-fall

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The impact of falling ash reaches all human activities, has effects on human and animal health and is subject to climate and ecosystem of the affected regions. From 1991 until 2015 (24 years), more than 5 eruptions with $VEI \geq 4$ in the Southern Volcanic Zone of the Andes occurred; pyroclastic, dust and volcanic ash were deposited (mostly) in Argentina. A recurring situation during eruptions of Hudson (1991), Chaiten (2008), Puyehue-Cordon Caulle (2011) and Calbuco (2015) volcanoes was the accumulation, storage and dump of volcanic ash in depressed areas, beaches, lakes, ditches, storm drains, areas of landfills and transfer stations. The issues that this practice has taken are varied: pollution of aquifers, changes in geomorphology and water courses, usually in "inconspicuous" zones, often in places where there are precarious population or high poverty settlements. The consequences are not immediate but the effects in the mid and long term bring serious drawbacks. On the contrary, a good example of intelligent management of the volcanic impact occurred many years before, during the eruption of Descabezado Grande (Quizapu) volcano in 1932. In that case, and as an example, the city of Trenque Lauquen, located nearly 770 km east of the volcano, decided a communitarian task of collection and burial of the ashfall in small areas, this was a very successful performance. The Quizapu ash plumes transported by the Westerlies (winds) covered with a blanket of volcanic ash the city, ashfall also reached the capital cities of Argentina (Buenos Aires) and Uruguay (Montevideo). Also, the bagging process of volcanic ash with reinforced plastics was an example of Good Practice in the management of the emergency. This allowed the entire affected community to take advantage of this "mineral resource" and contributes to achieving collective and participatory work leading to commercialization and sustainability of these products availed as fertilizers, granular base for ceramics and bricks, abrasive cleaning powders, raw material for cosmetics, glass, porcelain, etc. From a geoscientific deontology point of view, there are a wide range of parameters to be considered in terms of the interaction of human activities, the rapid own decisions, the roll in front of our colleagues, and the responsibility towards society and the environment. The ethical implications of geo communication and education must be supported under standards and strategic plans that address all socio-cultural aspects and include primarily, women heads of households and teachers who will have to make decisions for their children in times of emergency. After the eruption of 1932 there was a gap of 59 years without a significant eruption and ashfall in Argentina. Why the actions taken for the use of volcanic ash as a resource were not repeated during the eruptions occurred in 1991 and beyond? This contribution intends to answer this question which has multiple variables that turn around the economy, politics and socio-cultural traditions of European immigrants in Argentina.